D ata Interpretation

For questions in the Q uantitative C om parison form at (“Q uantity A ” and “Q uantity B ” given),the answ er choices are alw ays as follow s:

(A) Q uantity A is greater.
(B) Q uantity B is greater.
(C) The tw o quantities are equal.
(D) The relationship cannot be determ ined from the inform ation given.

For questions follow ed by a num eric entry box ☐,you are to enter your ow n answ er in the box.For questions follow ed by fraction-style num eric entry boxes ☐/☐,you are to enter your answ er in the form of a fraction.Y ou are not required to reduce fractions.For exam ple,if the answ er is 1/4,you m ay enter 25/100 or any equivalent fraction.

A ll num bers used are real num bers.A ll figures are assum ed to lie in a plane unless otherw ise indicated.G eom etric figures are not necessarily draw n to scale.Y ou should assum e,how ever,that lines that appear to be straight are actually straight,points on a line are in the order show n,and all geom etric objects are in the relative positions show n.C oordinate system s,such as *xy*-planes and num ber lines,as w ell as graphical data presentations such as bar charts,circle graphs,and line graphs, *are* draw n to scale.A sym bol that appears m ore than once in a question has the sam e m eaning throughout the question.

P roblem Set A

9th G rade Students at M illbrook H igh School

	B oys	G irls
Enrolled in Spanish	12	13
N ot Enrolled in Spanish	19	16

1.A pproxim ately w hat percent of the 9th grade girls at M illbrook H igh School are enrolled in Spanish?

(A) 21%
(B) 37%
(C) 45%
(D) 50%
(E) 57%

2.W hat fraction of the students in 9th grade at M illbrook H igh School are boys w ho are enrolled in Spanish?

(A) 1/5
(B) 19/60
(C) 5/12
(D) 12/31
(E) 12/25

3.W hat is the ratio of 9th grade girls not enrolled in Spanish to all 9th grade students at M illbrook M iddle School?

(A) 1 : 16
(B) 13 : 60
(C) 4 : 15
(D) 19 : 60
(E) 16 : 29

4.If *x* percent m ore 9th grade students at M illbrook H igh School are not enrolled in Spanish than are enrolled in Spanish,w hat is *x*?

(A) 20
(B) 25
(C) 30
(D) 40
(E) 50

5.If 2 of the 9th grade boys at M illbrook H igh school w ho are not enrolled in Spanish decided to enroll in Spanish, and then 8 new girls and 7 new boys enrolled in the 9th grade at M illbrook M iddle School and also in Spanish,w hat percent of 9th grade students at M illbrook w ould then be taking Spanish?

(A) 52%
(B) 53%
(C) 54%
(D) 55%
(E) 56%

P roblem Set B

N um ber of H ours W orked P er W eek per E m ployee at M arshville Toy C om pany

# of em ployees	H ours w orked per w eek
4	15
9	25
15	35
27	40
5	50

6.W hat is the m edian num ber of hours w orked per w eek per em ployee at M arshville Toy C om pany?

(A) 25
(B) 30
(C) 35
(D) 37.5
(E) 40

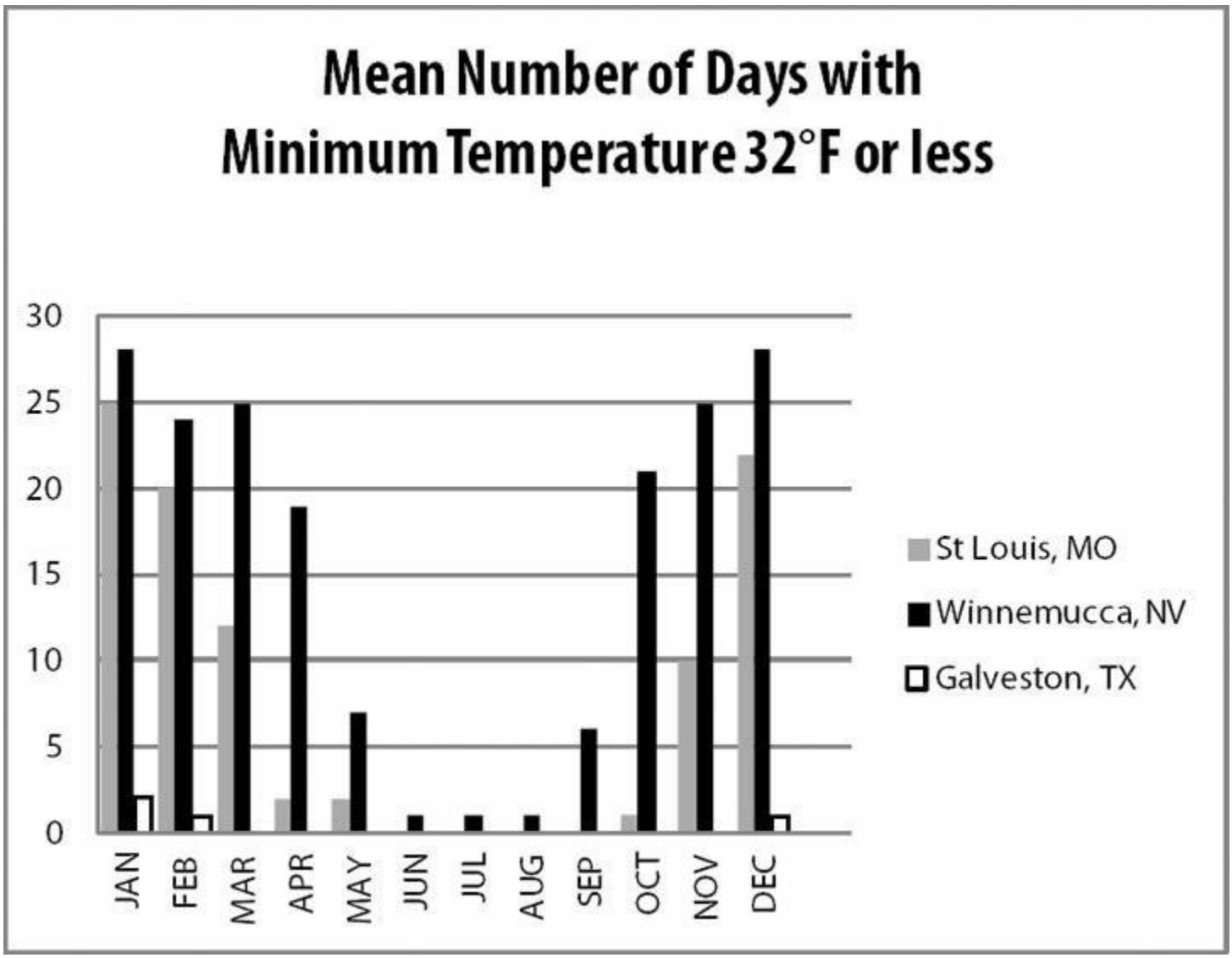
7.W hat is the average num ber of hours w orked per w eek per em ployee at M arshville Toy C om pany?

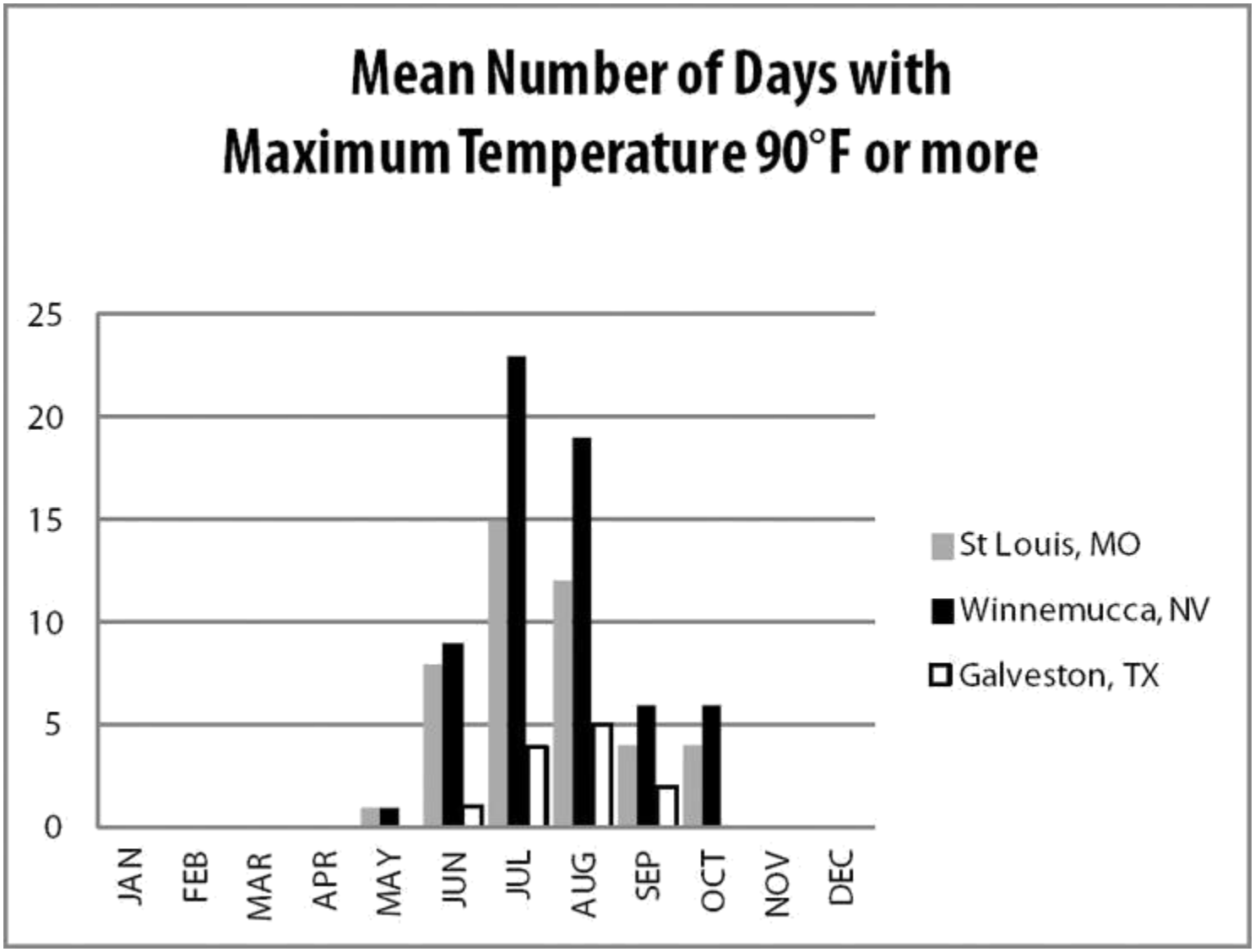
(A) 32
(B) 33
(C) 35
(D) $35\frac{2}{3}$
(E) $36\frac{1}{3}$

8.W hat is the positive difference betw een the m ode and the range of the num ber of hours w orked per w eek per em ployee at M arshville Toy C om pany?

(A) 0
(B) 4
(C) 5
(D) 8
(E) 26

P roblem Set C





9.In how m any m onths of the year w ere there m ore than 20 days w ith tem peratures 32°F or less in W innem ucca?

(A) 2
(B) 3
(C) 4
(D) 6
(E) 7

10.O n how m any days in the entire year did the tem perature in G alveston rise to at least 90°F or fall to,or below , 32°F?

(A) 11
(B) 16
(C) 28
(D) 42
(E) 59

11.A pproxim ately w hat percent of the days w ith m axim um tem perature of 90°F or m ore in St.Louis occurred in July?

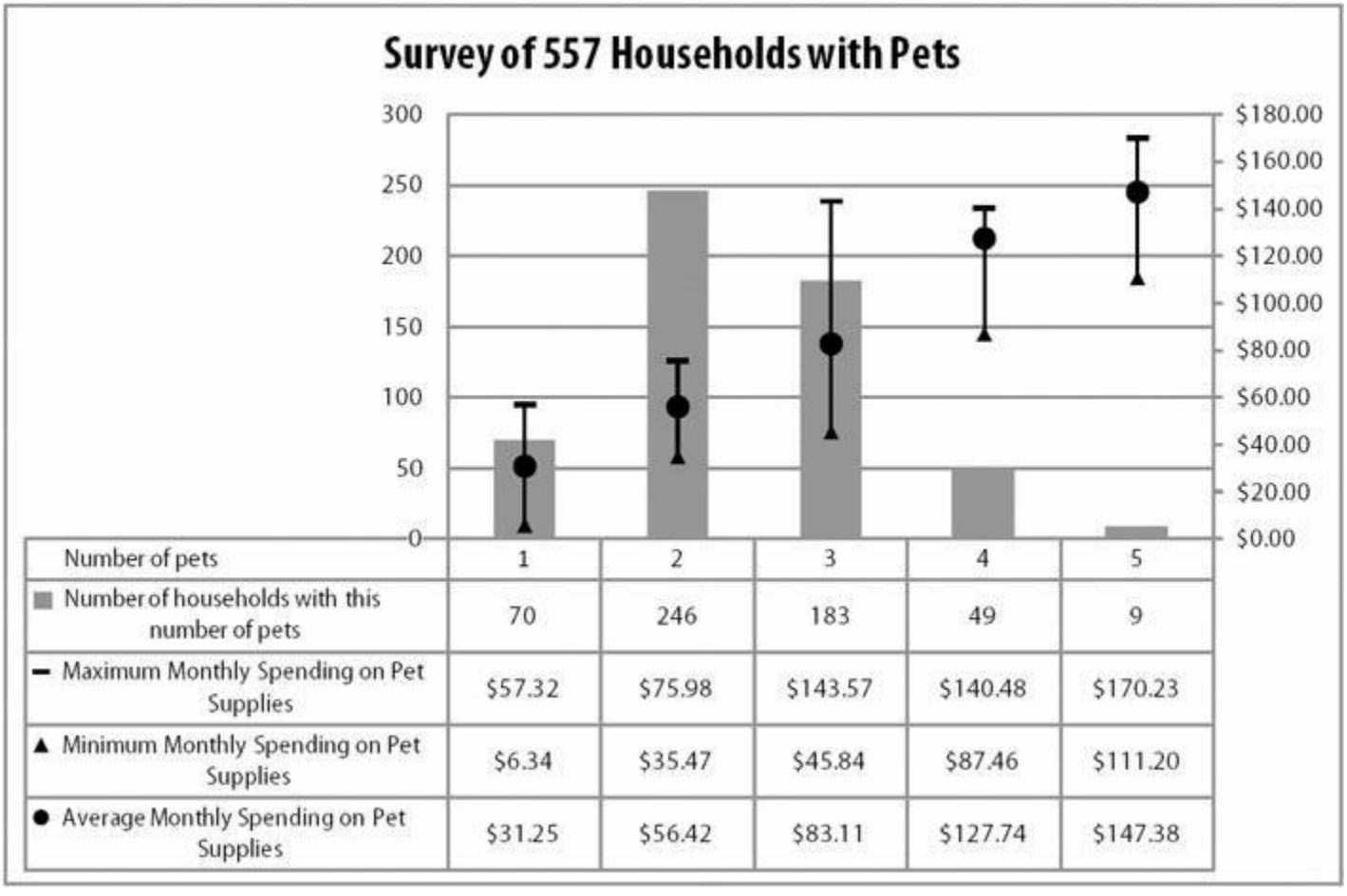
(A) 6%
(B) 15%
(C) 17%
(D) 34%

(E) 44%

12.The num ber of freezing January days in W innem ucca w as approxim ately w hat percent m ore than the num ber of freezing January days in St.Louis? (A “freezing” day is one in w hich the m inim um tem perature is 32°F or less.)

(A) 3%
(B) 6%
(C) 12%
(D) 24%
(E) 28%

P roblem Set D



Number of pets	1	2	3	4	5
Number of households with this number of pets	70	246	183	49	9
Maximum Monthly Spending on Pet Supplies	$57.32	$75.98	$143.57	$140.48	$170.23
Minimum Monthly Spending on Pet Supplies	$6.34	$35.47	$45.84	$87.46	$111.20
Average Monthly Spending on Pet Supplies	$31.25	$56.42	$83.11	$127.74	$147.38

13.A pproxim ately w hat percent of the surveyed households have m ore than three pets?

(A) 10%
(B) 20%
(C) 30%
(D) 40%
(E) 50%

14.W hat is the m edian num ber of pets ow ned by the households in the survey?

(A) 1
(B) 2
(C) 3
(D) 4
(E) 5

15.G rouping households by num ber of pets,w hat is the range of m onthly spending on pet supplies for the group w ith the largest range?

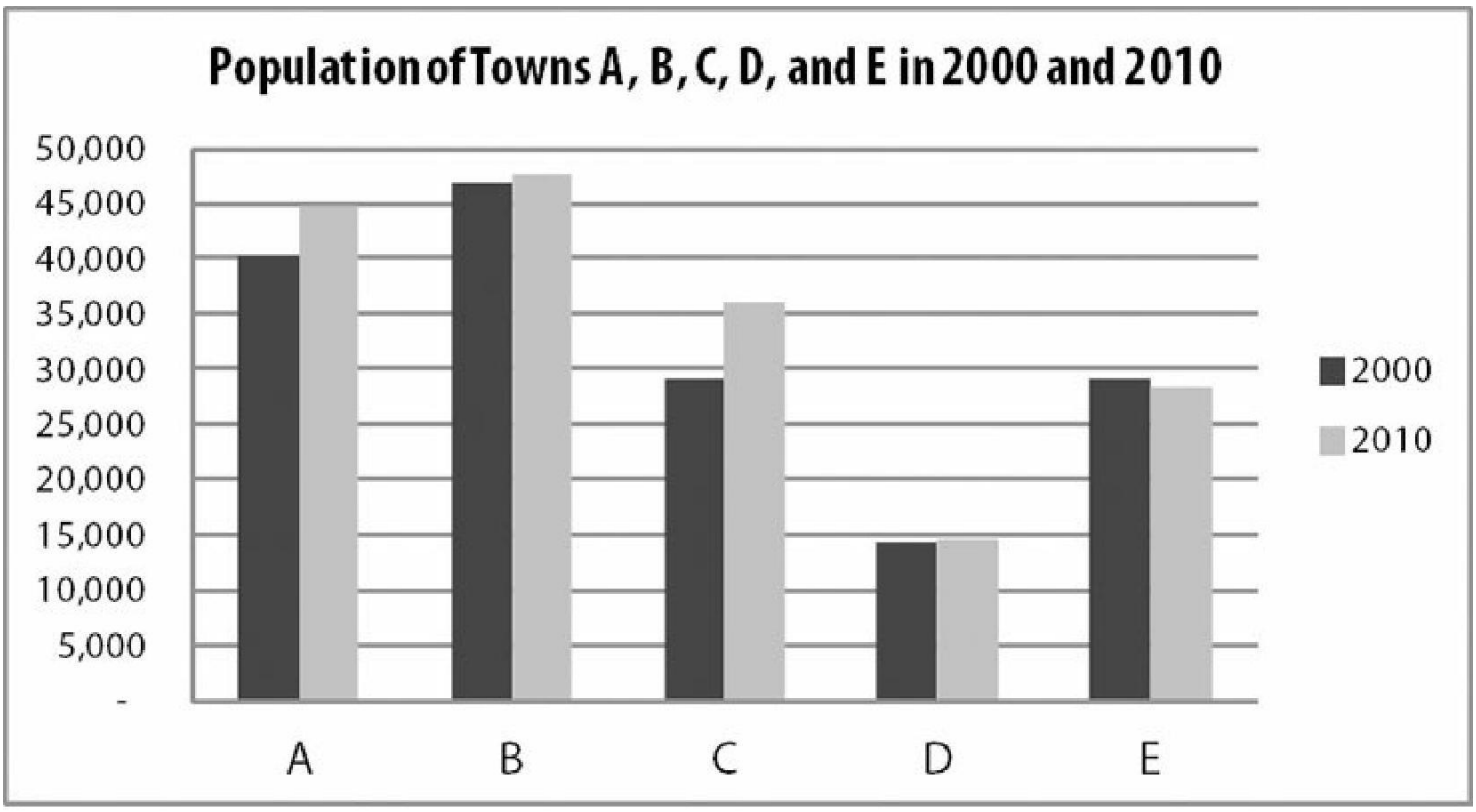
(A) $69.03
(B) $97.73
(C) $116.13
(D) $138.98

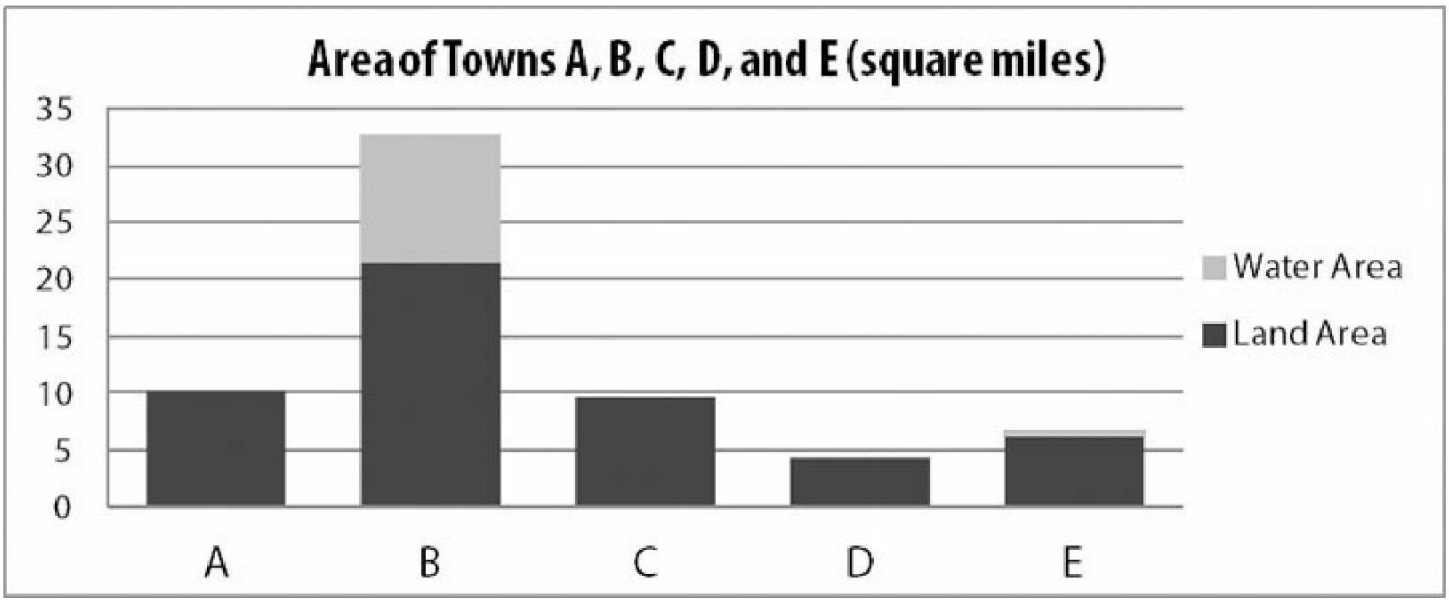
(E) $170.23

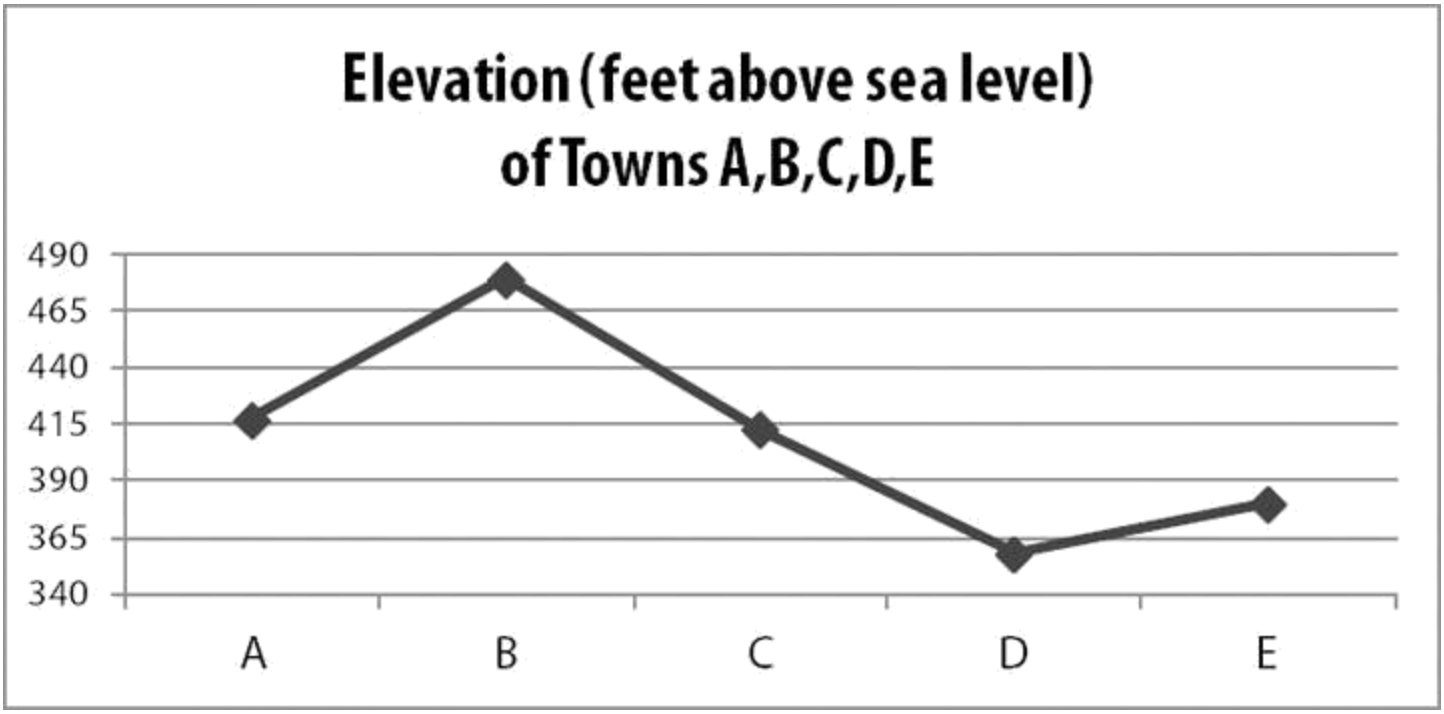
16.H ouseholds w ith how m any pets have the greatest average m onthly spending per pet?

(A) 1 pet
(B) 2 pets
(C) 3 pets
(D) 4 pets
(E) 5 pets

P roblem Set E







17.In w hat tow n did the population increase by the greatest percent betw een 2000 and 2010?

(A) Tow n A
(B) Tow n B
(C) Tow n C
(D) Tow n D
(E) Tow n E

18.The ratio of the population of one tow n to the population of another rem ained m ost unchanged betw een 2000 and 2010 for w hich tw o tow ns?

Indicate tw o such tow ns.

☐ Tow n A
☐ Tow n B
☐ Tow n C
☐ Tow n D
☐ Tow n E

19.The w ater area of tow n B is m ost nearly equal the total land area of w hich tw o tow ns?

Indicate tw o such tow ns.

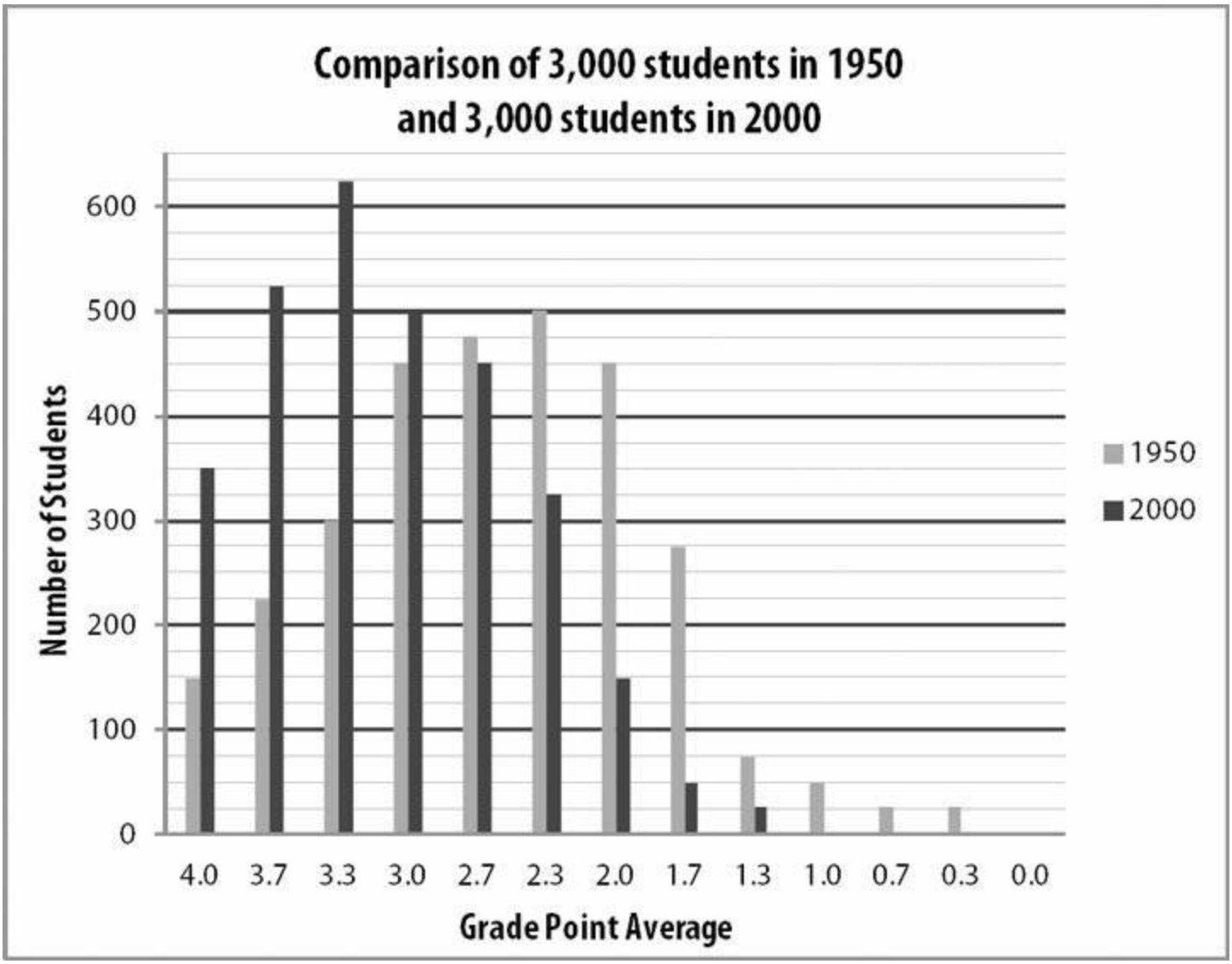
☐ Tow n A
☐ Tow n B
☐ Tow n C
☐ Tow n D
☐ Tow n E

20.W hich tw o tow ns have the m ost nearly equal elevation in feet above sea level?

Indicate tw o such tow ns.

- [ ] Tow n A
- [ ] Tow n B
- [ ] Tow n C
- [ ] Tow n D
- [ ] Tow n E

P roblem Set F



21.W hat w as the m ode for grade point average am ong the 3,000 students in 2000?

(A) 3.7
(B) 3.3
(C) 3.0
(D) 2.7
(E) 2.3

22.W hat w as the m edian grade point average am ong the 3,000 students in 1950?

(A) 3.7
(B) 3.3
(C) 3.0
(D) 2.7
(E) 2.3

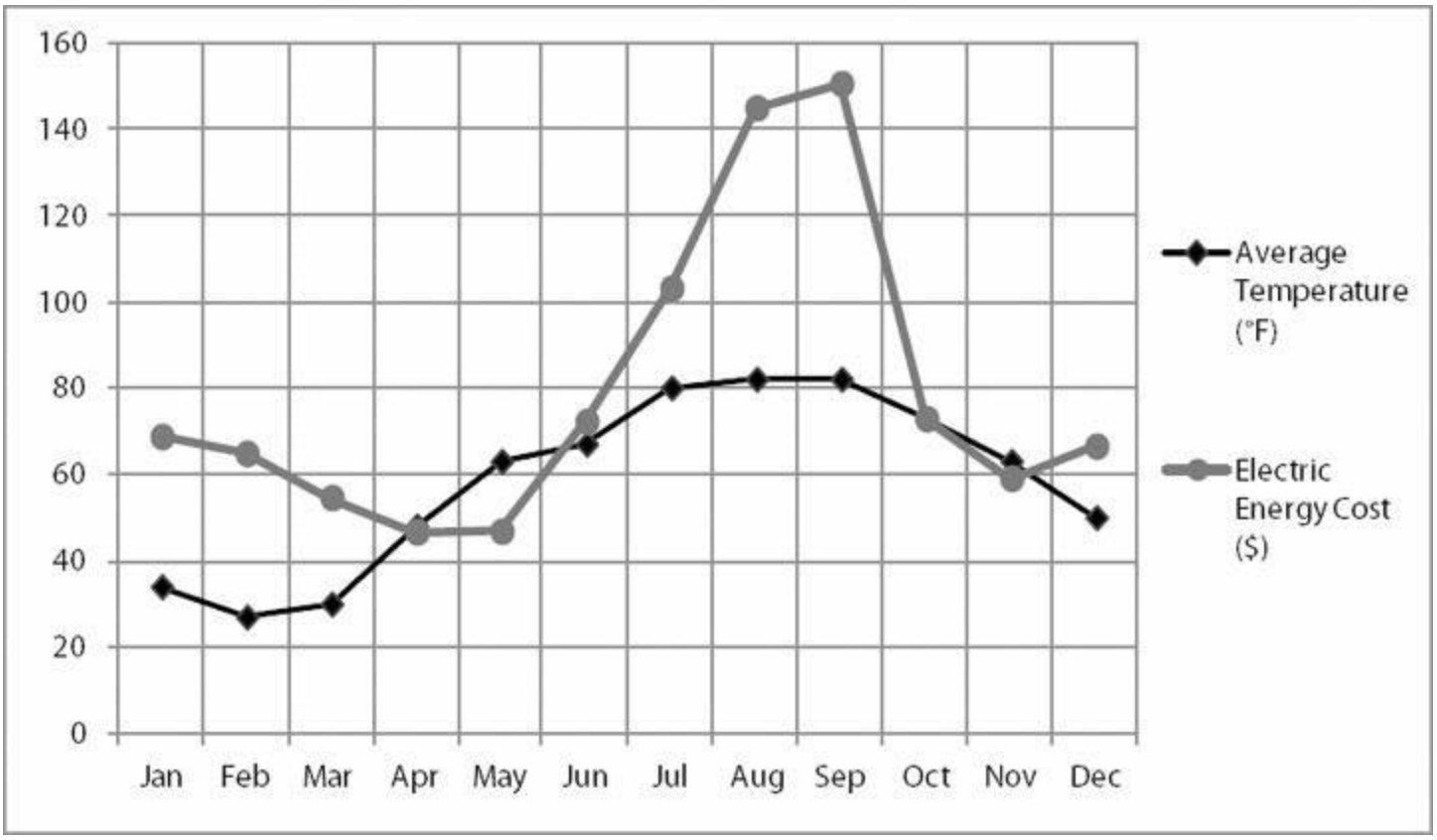
23.A pproxim ately w hat percent of the students in 2000 earned at least a 3.0 grade point average?

(A) 25%
(B) 50%
(C) 67%
(D) 80%
(E) 97.5%

24.A pproxim ately w hat percent of the students in 1950 earned a grade point average less than 3.0?

(A) 33%
(B) 37.5%
(C) 50%
(D) 62.5%
(E) 75%

P roblem Set G



25.Electric energy cost increased m ost betw een w hich tw o consecutive m onths?

Indicate tw o such m onths.

- ☐ January
- ☐ February
- ☐ M arch
- ☐ A pril
- ☐ M ay
- ☐ June
- ☐ July
- ☐ A ugust
- ☐ Septem ber
- ☐ O ctober
- ☐ N ovem ber
- ☐ D ecem ber

26.Electric energy cost changed least betw een w hich tw o consecutive m onths?

Indicate tw o such m onths.

- ☐ January

- ☐ February
- ☐ M arch
- ☐ A pril
- ☐ M ay
- ☐ June
- ☐ July
- ☐ A ugust
- ☐ Septem ber
- ☐ O ctober
- ☐ N ovem ber
- ☐ D ecem ber

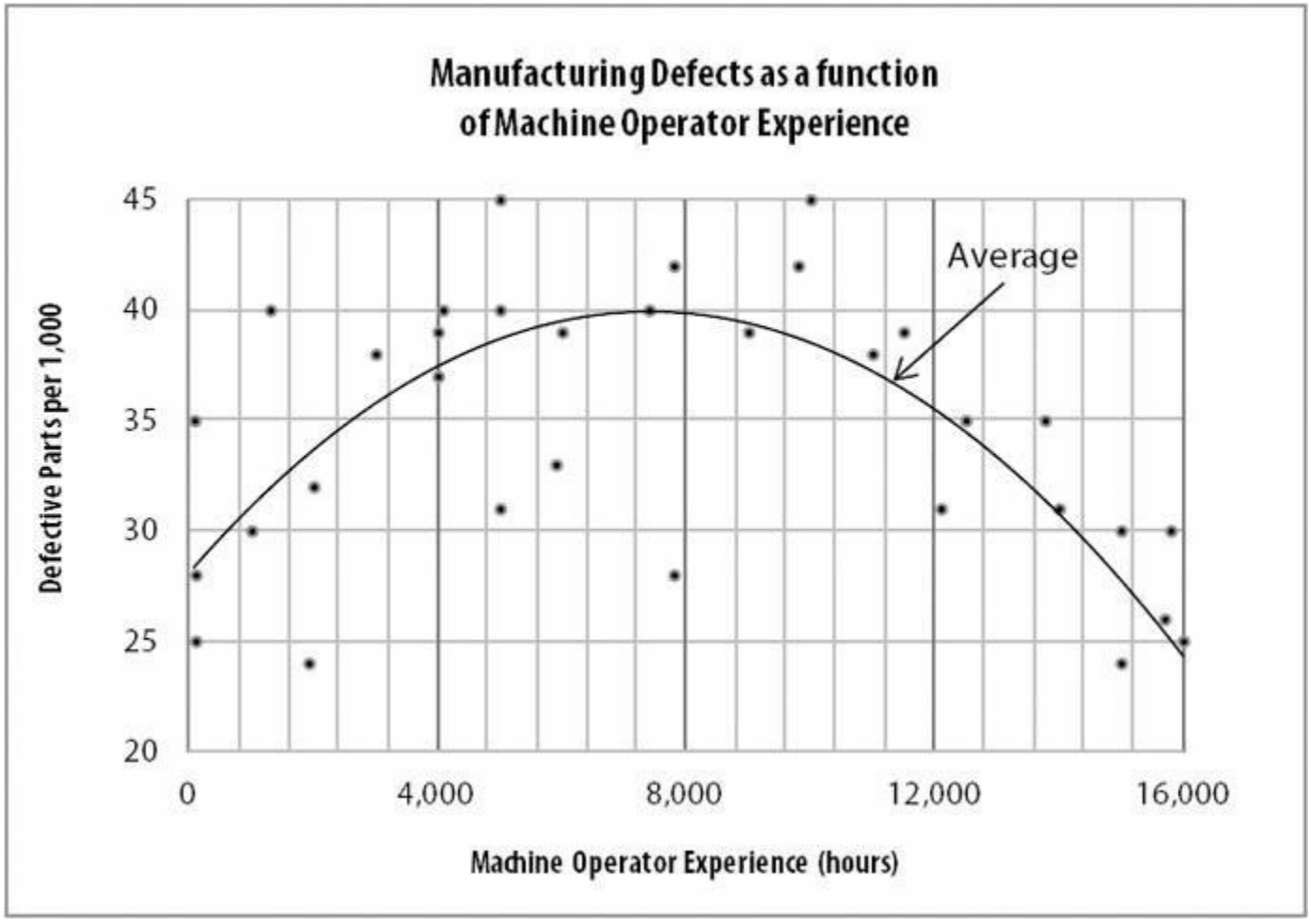
27.A pproxim ately w hat w as the average electric energy cost per m onth in the first half of the year?

(A) $45
(B) $50
(C) $60
(D) $70
(E) $75

28.In w hat m onth w as the electric energy cost per °F of average tem perature least?

(A) A pril
(B) M ay
(C) O ctober (D
) N ovem ber
(E) D ecem ber

P roblem Set H



29.O n average,the m achine operators that produce the few est defective parts per 1,000 have how m any hours of experience?

(A) 40
(B) 4,000
(C) 8,000
(D) 12,000
(E) 16,000

30.O n average,the defective part rate is equal for m achine operators w ith 12,000 hours and w ith approxim ately how m any hours of experience?

(A) 2,000
(B) 2,700
(C) 4,400
(D) 8,400
(E) 12,800

31.A t approxim ately w hat experience level,in hours,do m achine operators produce the m ost defective parts per 1,000,on average?

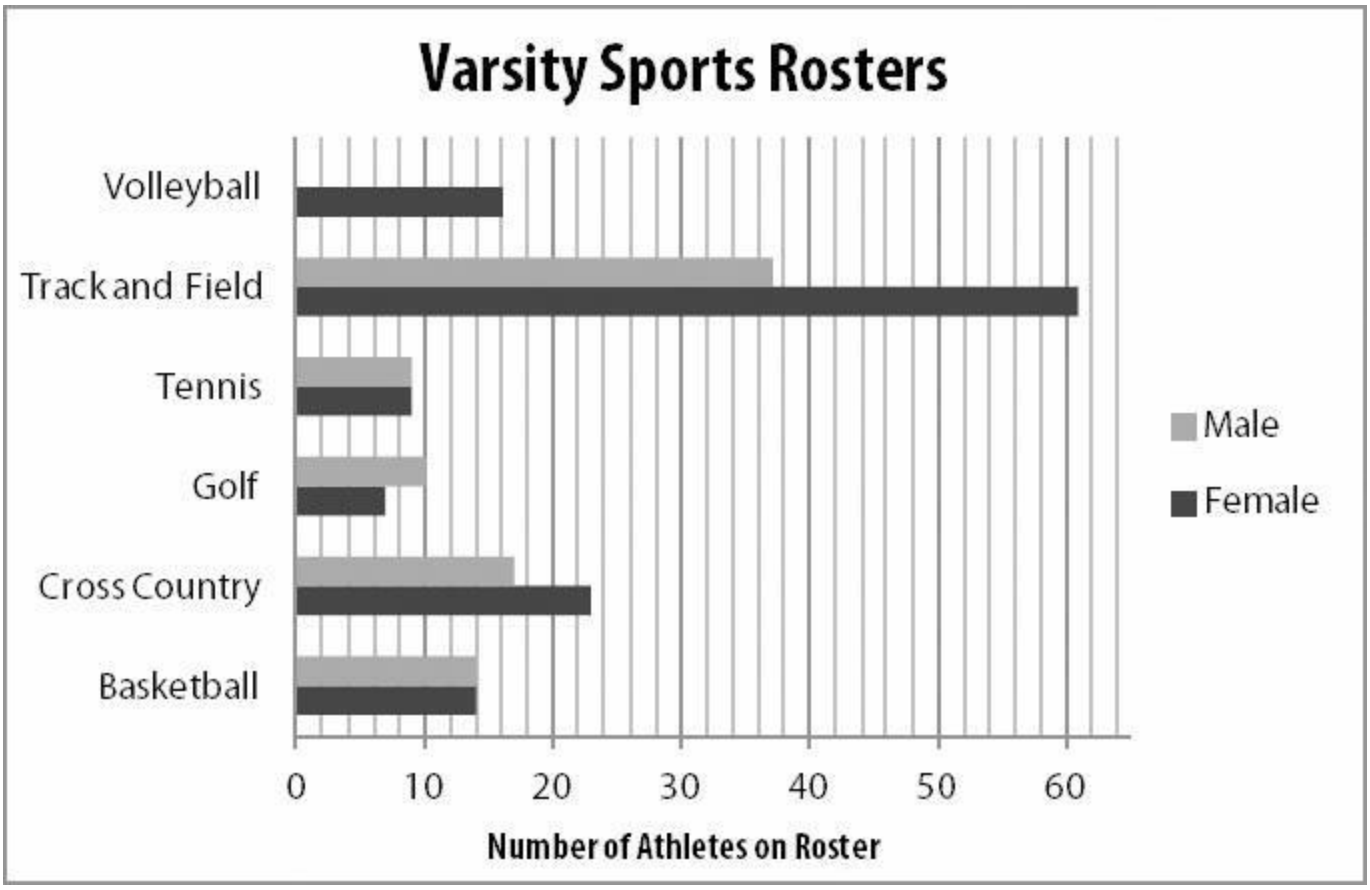
(A) 40

(B) 4,000
(C) 8,000
(D) 12,000
(E) 16,000

32.O f the tw o individual m achine operators w ho had a defective part rate of 4.2% ,approxim ately how m any hours of experience did the less experienced operator have?

(A) 2,300
(B) 5,000
(C) 7,700
(D) 9,800
(E) 15,100

P roblem Set I



33.W hat is the ratio of m ale athletes to fem ale athletes on the track and field roster?

(A) $\frac{37}{61}$

(B) $\frac{9}{14}$

(C) $\frac{17}{23}$

(D) $\frac{14}{9}$

(E) $\frac{61}{37}$

34.A ll athletes are on only one varsity sports roster EX C EPT those w ho run on both the Track and Field team and the C ross C ountry team .If there are 76 m ale athletes total on the varsity sports rosters,how m any m ale athletes are on both the Track and Field team and the C ross C ountry team ?

(A) 11
(B) 17
(C) 37
(D) 54
(E) 76

35.O n w hat varsity sports rosters do m ale athletes outnum ber fem ale athletes?

Indicate all such rosters.

- ☐ V olleyball
- ☐ Track and Field
- ☐ Tennis
- ☐ G olf
- ☐ C ross C ountry
- ☐ B asketball

36.W hat is the ratio of fem ale tennis players to m ale basketball players on the varsity sports rosters?

(A) $\frac{5}{12}$

(B) $\frac{9}{14}$

(C) $\frac{7}{8}$

(D) $\frac{14}{9}$

(E) $\frac{12}{5}$

P roblem Set J

	C hange in Total R evenue (2011 to 2012)	P ercent C hange in N um ber of D istinct C ustom ers (2011 to 2012)	P ercent C hange in Total C osts (2011 to 2012)
Store W	-$400,000	+2%	+15%
Store X	+ $520,000	+14%	+4%
Store Y	-$365,000	+5%	+12%
Store Z	+ $125,000	-7%	-20%

37.For w hich store w as the revenue per distinct custom er greatest in 2012?

(A) Store W
(B) Store X
(C) Store Y
(D) Store Z
(E) It cannot be determ ined from the inform ation given.

38.B etw een 2011 and 2012,total costs per distinct custom er increased by the greatest percent at w hich store?

(A) Store W
(B) Store X
(C) Store Y
(D) Store Z
(E) It cannot be determ ined from the inform ation given.

39.Store profit in 2012 could have been less than sam e store's profit in 2011 at w hich of the follow ing store(s)?

Indicate <u>all</u> such stores.

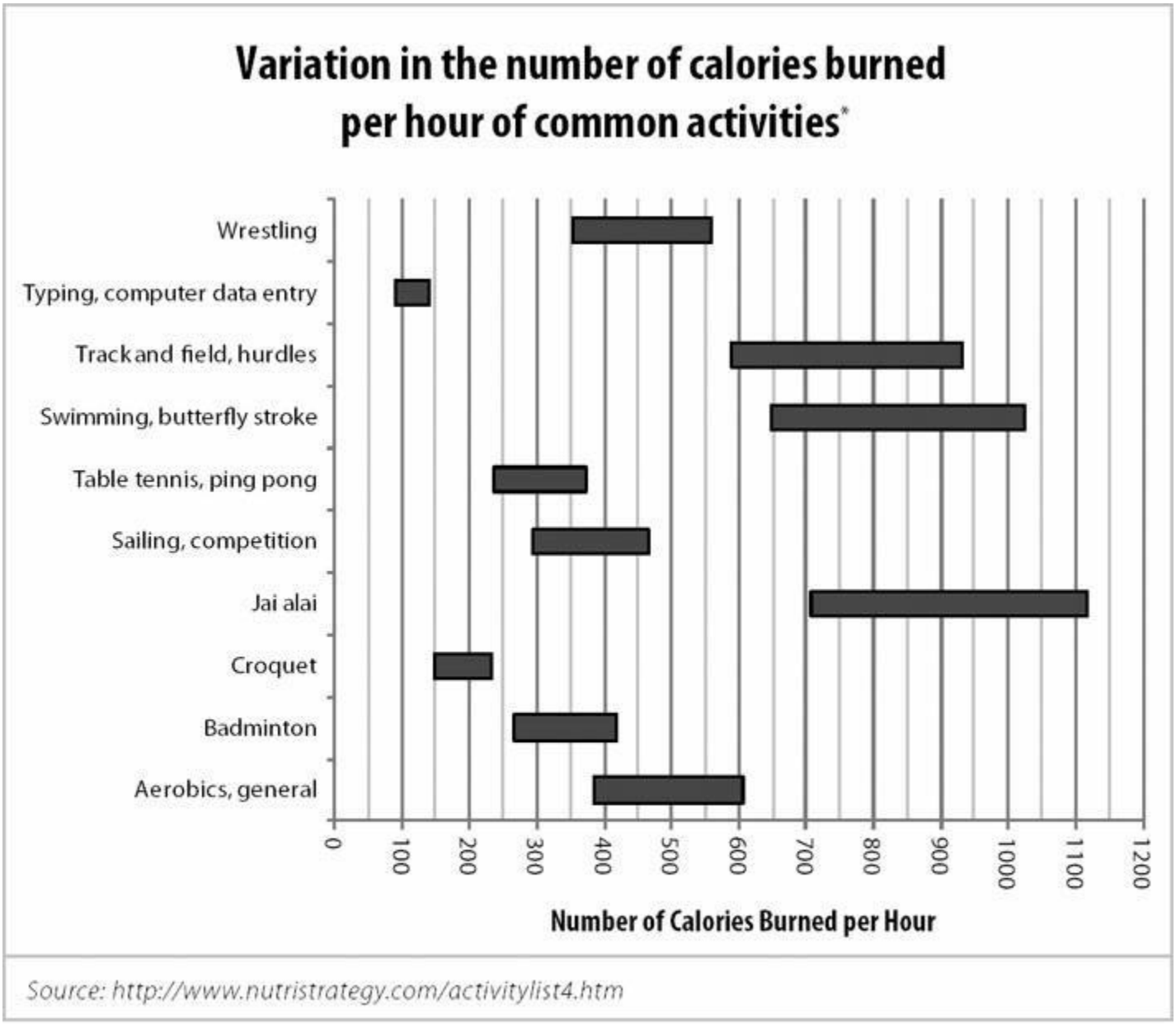
☐ Store W
☐ Store X
☐ Store Y
☐ Store Z
☐ N one of the above.

40.W hich of the follow ing statem ents m ust be true?

(A) O f the four stores,Store X had the greatest percent increase in revenue from 2011 to 2012. (B) Per custom er revenue increased at Store Z from 2011 to 2012. (C) O f the four stores,Store W had the greatest increase in total costs from 2011 to 2012. (D) O f the four stores,Store Y had the highest percent of repeat custom ers.

(E) In 2012,Store W and Store Z com bined had few er distinct custom ers than did Store X .

P roblem Set K



* Based on body weight of exercise subject. The lower limit represents the calories burned by a person weighing 130 pounds, while the upper limit represents the calories burned by a person weighing 205 pounds.

41.W hich of the follow ing statem ents could be true?

Indicate all such statem ents.

- ☐ A person w eighing betw een 130 and 205 pounds perform s one of the above activities for 10 hours yet burns few er calories than another person in the sam e w eight range perform ing another activity for only 1 hour.
- ☐ A 175 pound person playing jai alai for one hour burns few er calories than a 180 pound person sw im m ing the butterfly stroke for one hour.
- ☐ If all people in question w eigh betw een 130 and 205 pounds,the average calories burned by tw o

people playing table tennis for 1 hour is m ore than the total calories burned by 2 people typing for 3 hours.

42.W hich com bination of activities burns the few est calories total?

(A) A 130 pound person playing badm inton for 1 hour and a 205 pound person playing table tennis for 1 hour
(B) A 130 pound person w restling for 1 hour and a 205 pound person running track and field,hurdles for 1 hour
(C) A 130 pound person typing for 1 hour and a 205 pound person sw im m ing the butterfly stroke for 1 hour
(D) A 130 pound person sailing in a com petition for 1 hour and a 205 pound person doing aerobics for 1 hour
(E) A 130 pound person typing for 1 hour and a 205 pound person playing croquet for 1 hour

P roblem Set L

Population and GDP for 50 African Countries

Gross Domestic Product	Population: more than 50 million	20 to 50 million	10 to 20 million	2 to 10 million	less than 2 million	Total
more than $100 billion	3	2	0	0	0	5
$20 – 100 billion	1	7	1	1	0	10
$10 – 20 billion	1	3	3	3	3	13
less than $10 billion	0	0	7	8	7	22
Total	5	12	11	12	10	50

43.A m ong the 50 A frican countries represented in the chart above,how m any countries have a population betw een 10 m illion and 50 m illion people and a G D P betw een $10 billion and $20 billion?

(A) 6
(B) 7
(C) 13
(D) 16
(E) 23

44.A m ong the 50 A frican countries represented in the chart above,w hat percent of the countries have a population less than 20 m illion people and a G D P of less than $20 billion?

(A) 38%
(B) 44%
(C) 62%
(D) 68%
(E) 90%

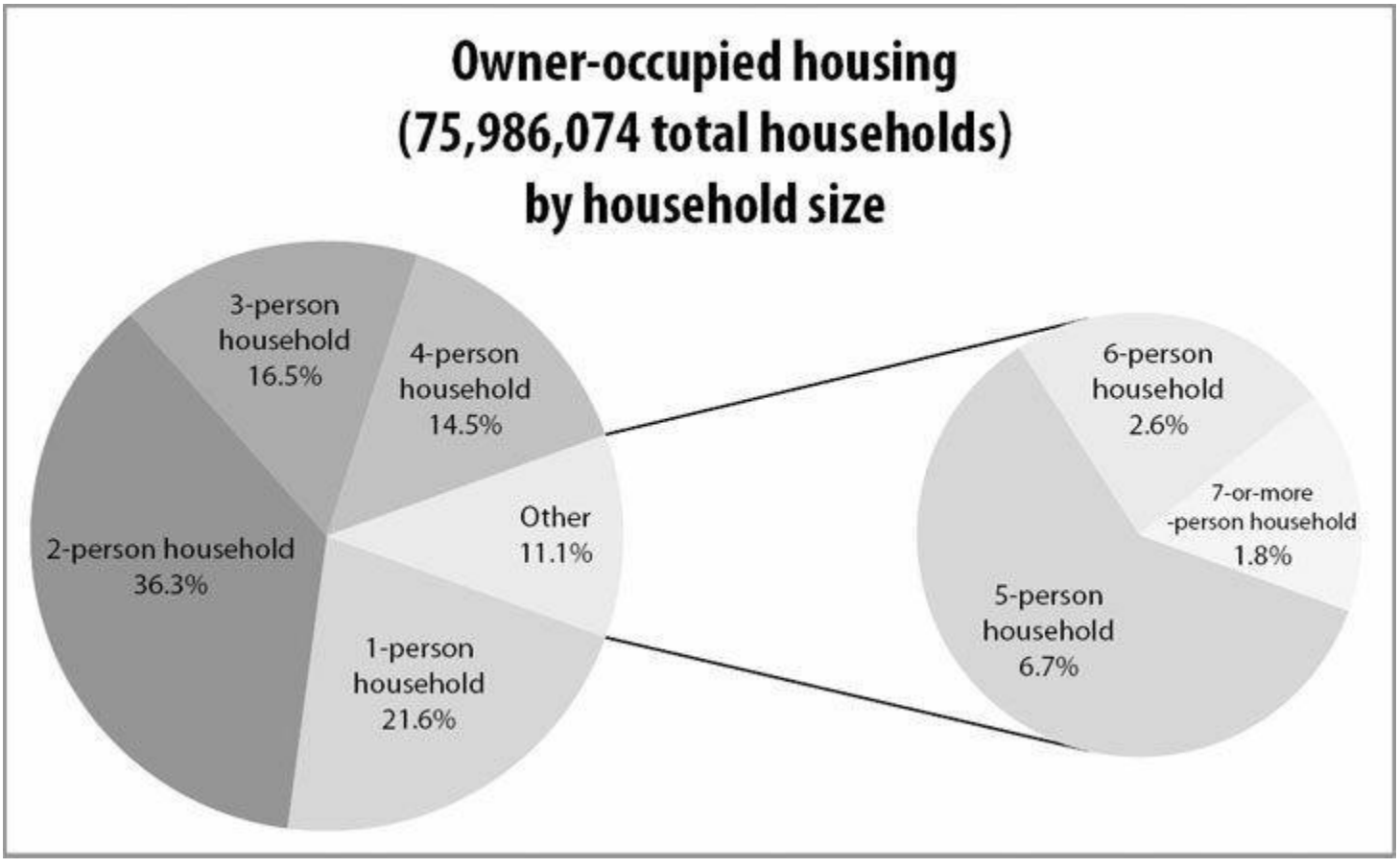
45.A pproxim ately w hat percent of the A frican countries in the chart above w ith G D Ps betw een $10 billion and $20 billion have populations betw een 10 m illion and 20 m illion?

(A) 6%
(B) 23%
(C) 26%
(D) 30%
(E) 51%

46.R eferring to the 50 A frican countries represented in the chart above,w hich of the follow ing is greatest?

(A) The num ber of countries w ith m ore than $10 billion G D P and population less than 20 m illion (B) The num ber of countries w ith less than $20 billion G D P and population m ore than 10 m illion (C) The num ber of countries w ith m ore than $20 billion G D P
(D) The num ber of countries w ith less than $100 billion G D P and population less than 10 m illion
(E) The num ber of countries w ith less than $100 billion G D P and population betw een 10 m illion and 50 m illion

P roblem Set M



47.W hat percent of ow ner-occupied housing units are households w ith few er than four people?

(A) 11.1%
(B) 14.5%
(C) 25.6%
(D) 74.4%
(E) 88.9%

48.A m ong the ow ner-occupied housing units represented in the chart above,approxim ately how m any households are 5-person households?

(A) 1 m illion
(B) 2 m illion
(C) 3 m illion
(D) 4 m illion
(E) 5 m illion

49.W hich of the follow ing is a correct ranking of 1-person households,3-person households,and 5-person households based on the total num ber of people living in such households,from least to greatest num ber of people?

(A) 1-person households,3-person households,5-person households
(B) 1-person households,5-person households,3-person households
(C) 3-person households,1-person households,5-person households

(D) 3-person households,5-person households,1-person households
(E) 5-person households,3-person households,1-person households

50.W hich range of household sizes,inclusive,accounts for m ore than 50% of all ow ner-occupied housing units?

(A) 2- to 3-person
(B) 3- to 4-person
(C) 4- to 5-person
(D) 5- to 6-person
(E) 6- to 7-person

D ata Interpretation A nsw ers

Problem Set A: First,read the title of the chart: everyone accounted for in the chart is a 9th grader at M illbrook M iddle School.So,w hen problem s m ention “9th grade,” you don’t have to figure out how m any people involved are 9th graders — everyone in the chart is.

W hen given a chart that depends on addition (boys plus girls = total students,and also those enrolled in Spanish plus those not enrolled in Spanish = total students),it can be helpful to sketch a quick version of the chart on your paper and to add a total colum n.(If the chart is large and this w ould be too tim e-consum ing,just im agine that the “Total” row and “Total” colum n are present,and only calculate w hat you need.) For exam ple:

	B oys	G irls	TO TA L
E nrolled in Spanish	12	13	
N ot E nrolled in Spanish	19	16	
TO TA L			

N ow add dow n and across:

	B oys	G irls	TO TA L
E nrolled in Spanish	12	13	25
N ot E nrolled in Spanish	19	16	35
TO TA L	31	29	60

1.**(C).**There are 29 total girls and 13 are enrolled in Spanish.The fraction of girls enrolled in Spanish is $\frac{13}{29}$.C onvert to a percent: $\left(\frac{13}{29}\times 100\right)\%$,or about 45% .

2.**(A).**There are 60 total students and 12 boys enrolled in Spanish.The answ er is 12/60,w hich reduces to 1/5.(R ead carefully! “W hat fraction of the students … are boys w ho are enrolled in Spanish?” is N O T the sam e as “W hat fraction of the boys are enrolled in Spanish?”)

3.**(C).**There are 16 girls not enrolled in Spanish and 60 total students.The ratio is 16/60,w hich reduces to 4/15 or 4 : 15.

4.**(D).**35 students are not enrolled in Spanish and 25 are.The question can be rephrased as,“35 is w hat percent greater than 25?” U sing the percent change form ula:

Percent C hange = $\left(\frac{Difference}{Original}\times 100\right)\%$

Percent C hange = $\left(\frac{10}{25}\times 100\right)\% = 40\%$

Thus,*x* is 40.

5.**(E)**.Sketch a new chart to reflect the changes.Sw itch 2 of the boys from “not enrolled” to “enrolled.” Then,add 8 new girls and 7 new boys to the “enrolled” groups,like this:

	B oys	**G irls**	**TO TA L**
E nrolled in Spanish	12 + 2 + 7 = 21	13 + 8 = 21	42
N ot E nrolled in Spanish	19 - 2 = 17	16	33
TO TA L	38	37	75

U pdate the Total row s and colum ns as w ell.Y ou w ill see that both “B oys” and “G irls”,as w ell as “Enrolled in Spanish” and “N ot Enrolled in Spanish,” now sum to a total of 75.

W hat percent of 9th grade students at M illbrook w ould then be taking Spanish? Since 42 out of 75 students w ould be enrolled in Spanish,enter 42/75 into your calculator,then m ultiply by 100 to convert to a percent.The answ er is 56% .

Problem Set B : This chart show s the frequency w ith w hich certain values — num bers of hours w orked per w eek — appear.That is,the chart is a short w ay of show ing a list of values that w ould begin: 15,15,15,15,25,25,25,25,25, 25,25,25,25… (then the num ber 35 fifteen tim es,then the num ber 40 tw enty-seven tim es,then the num ber 50 five tim es).A dd the num bers in the lefthand colum n to determ ine that 60 people’s w ork hours are being accounted for.

6.**(E).**The m edian of any list is the m iddle num ber or the average of the tw o m iddle num bers.H ow ever,you C A N N O T assum e that the m iddle num ber in the list 15,25,35,40,50 is the m edian num ber of hours w orked per w eek,because this does not take into account the *frequency* w ith w hich each of those num bers occurs in the list.The actual list includes the value 15 *four tim es* (once for each of the 4 em ployees w ho w orks 15 hours per w eek),the value 25 *nine tim es* (once for each of the 9 em ployees w ho w orks 25 hours per w eek),etc.

To find the m edian,add the num bers of em ployees: 4 + 9 + 15 + 27 + 5 = 60.Thus,the m iddle of this list w ill be the average of the 30th and 31st values.Since 4 + 9 + 15 = 28,the 29th,30th,31st,etc.values fall into the next highest group — the group of 27 people w ho w ork 40 hours per w eek.The m edian num ber of hours w orked per w eek per em ployee is 40.

7.**(D).**To average the num ber of hours w orked per w eek,you C A N N O T sim ply average 15,25,35,40,and 50.Y ou m ust take into account *how m any people* w ork each of those num bers of hours.That is,you m ust average the values for all 60 w orkers:

$$\frac{4(15)+9(25)+15(35)+27(40)+5(50)}{60} = 35.\overline{6} \text{ hours}$$

The answ er is $35.\overline{6}$ or $35\frac{2}{3}$.

8.**(C).**The m ode is the num ber that appears in the list w ith the greatest frequency.Since 27 people w orked 40 hours a w eek and every other group has few er than 27 people,the m ode is 40.The range is the highest value in the list m inus the low est value in the list.50 - 15 = 35.The positive difference betw een 40 and 35 is 40 - 35 = 5.

Problem Set C : The tw o charts show how often daily tem perature extrem es occurred in each m onth of the year for 3 cities.For the sake of sim plicity,you can think of the top chart as “cold” and the bottom chart as “hot.”

A lso note that there is no inform ation about exactly how hot or how cold the days tallied are: a day w ith a m inim um tem perature of 27°F counts as a “cold” day,just as a day w ith m inim um tem perature of -10°F w ould.Therefore,it is likely that questions w ill just reference one or both of the tw o tem perature categories broadly (= 90 and = 32),w hich you can sim ply think of as “hot” or “cold” days.

9.**(D).**From the “cold” chart,the black bar referring to W innem ucca rises above 20 in Jan,Feb,M ar,O ct,N ov,and D ec,for a total of 6 m onths.

10.**(B).**This question asks about num ber of days w ith both tem peratures extrem es in G alveston.G alveston had 1 “hot” day in June,4 in July,5 in A ugust,and 2 in Septem ber,for a total of 12.It had 2 “cold” days in January and 1 each in February and D ecem ber,for a total of 4.The total num ber of days w ith either extrem e tem perature is 16 days.

11.**(D).**From the grey bars on the “hot” day chart,St.Louis had a total of 1 + 8 + 15 + 12 + 4 + 4 = 44 days w hen the tem perature reached at least 90°F,and 15 of those w ere in July.These July days account for $\left(\frac{15}{44}\times 100\right)\% \approx 34\%$ of all the hot days in St.Louis (approxim ately).

12.**(C).**In January,W innem ucca had 28 freezing days,w hile St.Louis had 25.So the question is asking,“28 is w hat percent m ore than 25?” A nsw er this w ith the percent change form ula: $\left(\frac{Difference}{Original}\times 100\right)\% = \left(\frac{3}{25}\times 100\right)\% = 12\%$ .It is true that 28 is 12% m ore than 25% (check: 25 × 0.12 = 3).

Problem Set D : This table tallies the num ber of households,according to num ber of pets in the household,and each colum n captures inform ation about these households.For exam ple,the left-m ost colum n w ith num bers indicates that there are 70 households that have 1 pet,and these households spend an average of $31.25 per m onth on pet supplies. In that group,the household(s) that spent the least spent $6.34 on pet supplies,w hile the household(s) that spent the m ost spent $57.32.N otice that the bars and the m ax/m in/average range lines duplicate the inform ation in the table. For exact calculations,rely on the chart num bers.For broader questions,such as “w hich is greater,” the m ore visual representation of the data can often provide a quick answ er.

13.**(A).**There are 557 households,of w hich 49 have four pets and 9 have five pets.Thus a total of 58 households have m ore than three pets.To express this as a percent,take this num ber and divide by the total num ber of households. 58/557 = 10% (approxim ately).

14.**(B).**Since there are 557 households,the m edian household w ould be m idw ay betw een the 1st and 557th households on the list w hen the households are ranked according to how m any pets they ow n.The m idpoint betw een the 1st and 557th households is the (1 + 557)/2 = 279th household.C heck: There are 278 households below this one, and 278 households above (because 279 + 278 = 557).R anked by num ber of pets,households 1 through 70 (the first 70 households) have one pet,w hich m eans households 71 through 316 (in other w ords,the next 246 households) have tw o pets.Since the 279th household falls in this interval,the m edian household ow ns tw o pets.

15.**(B).**The group w ith the largest range of m onthly spending is the group of households that ow n three pets.This can be seen by looking at the length of the vertical line betw een the m axim um spending bar and the m inim um spending triangle.W ithin this group,the m axim um am ount spent is $143.57 and the m inim um is $45.84,so the range is $143.57 - $45.84 = $97.73.

16.**(D).**The group w ith one pet spent an average of $31.25 per pet,as indicated in the chart.The group w ith tw o pets spent an average of $56.42 on tw o pets,w hich is $28.21 per pet ($56.42/2).The third group spent an average of $83.11 on three pets,or $83.11/3 = $27.70 per pet (approxim ately).The fourth group spent an average of $127.74 on four pets,or $127.74/4 = $31.94 per pet (approxim ately).The fifth group spent an average of $147.38 on five pets,or $147.38/5 = $29.47 per pet (approxim ately).The highest average is am ong the group that has four pets.

A s an alternative to using the calculator for all five groups,you could benchm ark to $30 per pet.If that w ere the average spending per pet,the bottom row of the table w ould read $30,$60,$90,$120,and $150 from left to right. O nly the households w ith one or four pets exceed these num bers,so the correct answ er is one of them .For just those households,calculate average m onthly spending per pet as before.

Problem Set E :

17.**(C).**To com pare population in 2000 and 2010,look at the difference in the heights of the dark and light gray bars in the population bar chart.Population decreased in Tow n E,and w as barely changed in Tow ns B and D ,so focus on the rem aining Tow ns A and C .This difference is about 5,000 for tow n A (45,000 - 40,000),but is m ore than 5,000 for Tow n C (m ore than 35,000 - less than 30,000).The question asks for the “population increase by the greatest *percent*,” w hich requires com parison to the original (2000) population: Percent C hange = $\left(\frac{\text{Difference}}{\text{Original}} \times 100\right)\%$ .N ot only is the population increase greatest for Tow n C ,the population of Tow n C is sm aller than for Tow n A .The percent increase in population for Tow n A w as $\left(\frac{5{,}000}{40{,}000} \times 100\right)\% = 12.5\%$,but the percent increase in population for Tow n C w as about $\left(\frac{7{,}000}{29{,}000} \times 100\right)\% \approx 24\%$.

18.**Tow n B and Tow n D .**Translating “the ratio of the population of one tow n to the population of another rem ained m ost unchanged betw een 2000 and 2010 for w hich tw o tow ns” literally:

$$\frac{\text{FirstTown}_{2000}}{\text{SecondTown}_{2000}} \text{ is most equal to } \frac{\text{FirstTown}_{2010}}{\text{SecondTown}_{2010}} \text{ for which two towns?}$$

$$\text{Or } \frac{\text{FirstTown}_{2000}}{\text{SecondTown}_{2000}} \approx \frac{\text{FirstTown}_{2010}}{\text{SecondTown}_{2010}} \text{ for which two towns?}$$

C ross m ultiplying,this could be rephrased as $\frac{\text{SecondTown}_{2010}}{\text{SecondTown}_{2000}} \approx \frac{\text{FirstTown}_{2010}}{\text{FirstTown}_{2000}}$ for w hich tw o tow ns? G oing back to w ords,this is like asking “W hich tw o tow ns had the m ost sim ilar population increase or decrease (as a percent or fraction)?

The percent change in population for each tow n w as:

Tow n A : $\frac{5{,}000}{40{,}000} \times 100\% = 12.5\%$

Tow n B : about $\frac{1{,}000}{47{,}000} \times 100\% = \text{a bit over } 2\%$

Tow n C : about $\frac{7{,}000}{29{,}000} \times 100\% \approx 24\%$

Tow n D : about $\frac{\text{at most } 500}{\text{at least } 14{,}000} \times 100\% = \text{at most } 3.5\%$

Tow n E: negative % (population decreased)

W hile the calculations w ere rough and the num bers are not quite equal for tow ns B and D ,these tw o percents are closest to each other,and all of the percents calculated for the other tow ns are quite unique.

19.**Tow n D ,Tow n E .**In the bar chart for area,dark gray represents the land area and light gray (stacked on top) represents the w ater area.Thus,to find w ater area,subtract the height of the dark gray land area bar from the total height of the stacked bars.

W ater area of Tow n B is about 32– 21 = 11.Since the vertical scale is not that precise,you m ay w ant to consider a range.W ater area for Tow n B is a little m ore than 10,as the top of the dark gray bar is slightly *closer* to the horizontal line for 20 than the top of the light gray bar is to the horizontal line for 30.Sim ilarly,w ater area for Tow n B m ust be less than 12.5,as the top of the light gray bar is halfw ay betw een 30 and 35,but the top of the dark gray bar is clearly higher than 20.

Tow ns C ,D ,and E all have land area less than 10 square m iles (i.e.all are below horizontal grid line for 10).A dding the land area of Tow n C (a bit less than 10) to that of Tow n D (about 4),the result is too high.The sum of land area in Tow ns D and E is about 4 + about 6 (certainly less than 7.5),for a result closest to 11.

20.**Tow n A and Tow n C .**In the elevation chart,the tow ns are on the *x*-axis and the elevation (in feet above sea level) is on the *y*-axis.Tw o tow ns have the sam e elevation if m arked at the sam e *y* value,i.e.if their data points are on the sam e horizontal line.Tow ns A and C are both close to the horizontal line for 415.

Problem Set F : The dark gray bars indicate num ber of students in 2000,and the light gray bars indicate num ber of students in 1950,having various grade point averages.A lthough the title m akes it unnecessary to do so,if you totaled the num ber of students in each bar color,you w ould get 3,000 students.

N ote the general contrast betw een students in the tw o years.C onnecting the top of each light gray bar w ith a sm ooth line,the result w ould be a sort-of bell curve that peaks at grade point average of 2.3.Sim ilarly,the dark gray bars form

a sim ilar bell curve,but its peak is at grade point average of 3.3,so the grades in general are clustered at the higher end of the scale in 2000.

21.**(B).**The m ode of a list of num bers is the num ber that occurs m ost frequently in the list.In the bar graph for grade point average,dark gray bars represent the students in 2000,and the m ode of that data set is indicated by the tallest dark gray bar.This is at grade point average of 3.3.There w ere 625 students w ith a grade point average of 3.3 in the year 2000,m ore students than had any other grade point average.

22.**(D).**The m edian is the “m iddle value” of an ordered list of num bers,dividing the list into roughly tw o equal parts. For the 3,000 students in 1950,the m edian grade point average is the average of the 1,500th highest grade point average and the 1,501st highest grade point average.The students in 1950 are represented by the light gray bars.

150 students had a 4.0 grade point average.
225 students had a 3.7 grade point average.(Total w ith this G PA and higher = 150 + 225 = 375)
300 students had a 3.3 grade point average.(Total w ith this G PA and higher = 375 + 300 = 675)
450 students had a 3.0 grade point average.(Total w ith this G PA and higher = 675 + 450 = 1,125)
475 students had a 2.7 grade point average.(Total w ith this G PA and higher = 1,125 + 475 = 1,600)

The 1,500th and 1,501st students fall betw een the 1,125th and 1,600th students.Thus,the 1,500th and 1,501st highest grade point averages are both 2.7.

23.**(C).**The students in 2000 are represented by the dark gray bars.

350 students had a 4.0 grade point average.
525 students had a 3.7 grade point average.
625 students had a 3.3 grade point average.
500 students had a 3.0 grade point average.

There w ere 350 + 525 + 625 + 500 = 2000 students w ho earned at least a 3.0 grade point average in the year 2000, out of a total of 3000 students.This is $\frac{2}{3}$ of the students,or about 67% of the students.

24.**(D).**The students in 1950 are represented by the light gray bars.

150 students had a 4.0 grade point average.
225 students had a 3.7 grade point average.
300 students had a 3.3 grade point average.
450 students had a 3.0 grade point average.

In 1950,150 + 225 + 300 + 450 = 1,125 students had a grade point average of 3.0 or higher.Thus,3,000 – 1,125 = 1,875 students earned a grade point average *less than* 3.0.A s a percent of the class,this w as $\left(\frac{1,875}{3,000}\times 100\right)\% = 62.5\%$.

Problem Set G : The vertical num ber scale on the left side of the graph applies to both data sets,but for A verage Tem perature the units are °F and for Electric Energy C ost the units are dollars ($).For exam ple,in January the average tem perature w as betw een 30°F and 40°F and the electric energy cost w as about $70.B e careful to read data

from the correct set;it w ould be easy to m ix up w hich line is w hich.C onsult the key frequently,and double-check your answ ers.

25.**July and A ugust only.**Electric energy cost is represented by the light gray line and circular data points.A cost increase from one m onth to the next w ould m ean a positive slope for the line segm ent betw een the tw o circular data points.The greater the slope of the light gray line segm ent,the greater the cost increase betw een those tw o m onths. There w as an increase each m onth betw een M ay and Septem ber,and again betw een N ovem ber and D ecem ber.B ut the steepest positive slope is betw een July and A ugust.

The cost increase from July to A ugust w as approxim ately $145 - $103 = $42.For com parison,the cost increase from June to July w as only about $103 - $70 = $33.The correct answ ers are July and A ugust.

26.**A pril and M ay only.**Electric energy cost is represented by the light gray line and circular data points.A cost increase from one m onth to the next w ould m ean a positive slope for the line segm ent betw een the tw o data points, and a cost decrease w ould m ean a negative slope.The steeper the slope of the line segm ent,the greater the cost change betw een tw o consecutive m onths.A cost change of $0 w ould m ean the line segm ent has a slope of 0 (i.e.,it is horizontal).

To find the tw o consecutive m onths w ith the sm allest electric energy cost change,look for the light gray line segm ent that is m ost horizontal.The line segm ent betw een A pril and M ay is nearly horizontal.The correct answ ers are A pril and M ay.

27.**(C).**There are tw o w ays to approxim ate average electric energy cost per m onth in the first half of the year.

O ne w ay is to read the electric energy costs off of the chart and com pute the average for the first 6 m onths,using the light gray circular data points:

A pproxim ate average cost = $\frac{\$70+\$65+\$55+\$47+\$47+\$70}{6}=\frac{\$354}{6}=\$59$.A nsw er choice (C) $60 is closest.

The other solution m ethod is m ore visual.C onsider choice (A) $45,and im agine a horizontal line at $45.A ll 6 cost data points for the first half of the year are above this horizontal line,so the average m ust be m ore than $45.Sim ilarly, im agine a horizontal line at $75 for choice (E).A ll 6 cost data points for the first half of the year are below this horizontal line,so the average m ust be less than $75.W hen a horizontal line at $60 is considered,the 6 cost data points “balance”: 3 are above the line and 3 are below ,by approxim ately the sam e am ount.

28.**(B).**To m inim ize $\frac{\text{Electric Energy Cost }(\$)}{\text{Average Temperature }(^\circ F)}$,m inim ize cost (light gray circular data points) w hile m axim izing average tem perature (black diam ond data points).O nly in A pril,M ay,O ctober,and N ovem ber is the black data point equal or greater than the gray data point (i.e.,the $\frac{\text{Electric Energy Cost }(\$)}{\text{Average Temperature }(^\circ F)}$ ratio is equal or less than 1).In A pril,O ctober,and N ovem ber,this ratio is close to 1.In M ay,the difference betw een the cost ($) and the average tem perature (°F) is greatest,so the electric energy cost per °F of average tem perature is least.The correct answ er is M ay.

Problem Set H : The chart show s defective parts per 1,000 (i.e.,rate of m aking m istakes) as a function of m achine operator experience.The dots indicate individual m achine operators,and there is quite a bit of variance by individual. The line labeled “A verage” show s the average perform ance of the group as a w hole.A trend em erges: inexperienced m achine operators and very experienced m achine operators m ake few er m istakes than those w ith m edium level of experience.A lso,certain individual m achine operators are m uch “better” (i.e.,they produce defective parts at a low er rate) than others,even w ith sim ilar levels of experience.

29.**(E).**B ecause the question specifies “on average,” refer to the curve m arked “A verage” rather than the individual data points.The few est defective parts per 1,000 on the chart is w here this average curve is low est: operators w ith 16,000 hours of experience produce a little less than 25 defective parts per 1,000.A nother low point is for operators w ith m inim al experience,but even they produce betw een 25 and 30 defective parts per 1,000.In contrast,the defective part rate is m axim ized at the top of the curve: operators w ith 8,000 hours of experience produce about 40 defective parts per 1,000.

30.**(B).**B ecause the question specifies “on average,” refer to the curve m arked “A verage” rather than the individual data points.M achine operators w ith 12,000 hours of experience produce an average of about 36 defective parts per 1,000.

The other group of m achine operators that produces about 36 defective parts per 1,000 has a little less than 3,200 hours of experience.(N ote that there are 5 grid lines for every 4,000 hours,so each vertical grid line is 800 hours apart.The grid m ark to the left of the 4,000 m ark represents 4,000 - 800 = 3,200 hours.) C hoice (B) is close to and less than 3,200.

A lternatively,look up the average defective part rate for m achine operators w ith the hours of experience listed in the choices:

(A) 2,000 hours (around 33 or 34 defective parts per 1,000).
(B) C O R R EC T.2,700 hours (a bit over 35 defective parts per 1,000). (C) 4,400 hours (around 38 defective parts per 1,000).
(D) 8,400 hours (a bit less than 40 defective parts per 1,000).
(E) 12,800 (around 34 defective parts per 1,000).

31.**(C).**B ecause the question specifies “on average,” refer to the curve m arked “A verage” rather than the individual data points.The defective part rate is m axim ized at the top of the curve: operators w ith 8,000 hours of experience produce about 40 defective parts per 1,000.

32.**(C).**B ecause the question refers to “individual m achine operators,” refer to the individual data points rather than the curve m arked “A verage.”

A defective part rate of 4.2% equates to $\frac{4.2}{100} \times 1{,}000 = 42$ defective parts per 1,000.O n the chart,there are only 2 data points that fall betw een 40 and 45 defective parts per 1,000,and they do seem to be at 42 defective parts per 1,000.The less experienced of these tw o m achine operators had just under 8,000 hours of experience.

Problem Set I:

33.**(A).**N ote that there are 5 vertical grid lines for every 10 athletes,so each vertical grid line accounts for 2 people. O n the track and field roster,there are betw een 36 and 38 m en (so it m ust be 37) represented by the light gray bar.O n the track and field roster,there are betw een 60 and 62 w om en (so it m ust be 61) represented by the dark gray bar.In fraction form ,the “ratio of m en to w om en” is $\frac{\text{men}}{\text{women}}$.The correct answ er is $\frac{37}{61}$.

34.**(A).**N ote that there are 5 vertical grid lines for every 10 athletes,so each vertical grid line accounts for 2 people. Male athletes are represented by the light gray bars for each sport.Sum the m ale athletes on each of the separate varsity sports rosters.

Males on V olleyball roster: 0
Males on Track and Field roster: betw een 36 and 38 (so it m ust be 37)
Males on Tennis roster: betw een 8 and 10 (so it m ust be 9)
Males on G olf roster: 10
Males on C ross C ountry roster: betw een 16 and 18 (so it m ust be 17)
Males on B asketball roster: 14

There are 0 + 37 + 9 + 10 + 17 + 14 = 87 m ale nam es on all of the rosters com bined,but there are only 76 m ale athletes total.Since tennis,golf,and basketball players are all on one roster only,there m ust be 87 - 76 = 11 m ale athletes w ho are counted tw ice by being on both the Track and Field team and the C ross C ountry team .The correct answ er is 11.

35.**G olf only.**M ale athletes are represented by the light gray bars,fem ale athletes by the dark gray bars.A sport in w hich m ale athletes outnum ber fem ale athletes w ill have a shorter dark gray bar than light gray bar.

This is only the case for golf,w here there are 10 m ale athletes and 7 fem ale athletes.V olleyball only has fem ale athletes,so they outnum ber the zero m ale athletes on the roster.In tennis and basketball,there are equal num bers of m en and w om en.Fem ale athletes outnum ber m ale athletes on the C ross C ountry and Track and Field rosters.

36.**(B).**N ote that there are 5 vertical grid lines for every 10 athletes,so each vertical grid line accounts for 2 people. There are betw een 8 and 10 fem ale tennis players (so it m ust be 9) represented by the dark gray bar next to “Tennis.” There are 14 m ale basketball players represented by the light gray bar next to “B asketball.” In fraction form ,the “ratio of fem ale tennis players to m ale basketball players” is $\frac{\text{female tennis players}}{\text{male basketball players}}$.Thus,the answ er is $\frac{9}{14}$.

Problem Set J: This chart com pares four stores,providing inform ation about change from 2011 to 2012 in three m etrics: total revenue,num ber of distinct custom ers,and total costs.It is essential to note that change in total revenue is given in term s of dollars ($),w hereas changes in num ber of distinct custom ers and in total costs are given only in percent term s.In general,percents provide less inform ation than absolute num bers,as the total (i.e.,percent of w hat?) is needed for context.

37.**(E).**It m ay be tem pting to select Store Z,as revenue increased from 2011 to 2012 w hile num ber of distinct custom ers decreased,but be careful w hen m ixing absolute num bers and percents.W ithout know ing the revenue in 2012 (only the change from the previous year is know n) or the num ber of custom ers (only the percent change from the previous year is know n) for any of the stores,you cannot determ ine the answ er.

38.**(A).**B ecause the question is about costs per custom er,both of w hich are given in percent change term s in the chart,and the question asks about percent change for this ratio,a com parison can be m ade am ong the stores.The percent change form ula in general is $\left(\frac{\text{Difference}}{\text{Original}} \times 100\right)\%$.Thus,the percent change in total costs per distinct custom er at a particular store is:

$$\left(\frac{\frac{\text{cost}_{2012}}{\text{customer}_{2012}} - \frac{\text{cost}_{2011}}{\text{customer}_{2011}}}{\frac{\text{cost}_{2011}}{\text{customer}_{2011}}} \times 100\right)\%$$

This looks like a m ess,but rem em ber that both cost 2012 and custom er 2012 can be w ritten in term s of cost 2011 and custom er 2011,respectively,based on the percent changes given in the table.Then cost 2012 and custom er 2012 are in each term of the fraction and can be canceled.For exam ple,for Store W ,the percent change in total costs per distinct custom er is:

$$\left(\frac{\frac{1.15 \times \text{cost}_{2011}}{1.02 \times \text{customer}_{2011}} - \frac{\text{cost}_{2011}}{\text{customer}_{2011}}}{\frac{\text{cost}_{2011}}{\text{customer}_{2011}}} \times 100\right)\% = \left(\frac{\frac{1.15}{1.02} - 1}{1} \times 100\right)\% = \left(\left(\frac{1.15}{1.02} - 1\right) \times 100\right)\%$$

In other w ords,the m agnitude of percent change in total costs per distinct custom er depends only on the ratio of (1 + Percent C hange in Total C osts) to (1 + Percent C hange in N um ber of D istinct C ustom ers).Perform this com parison for all of the stores.

(A) Store W : $\frac{1.15}{1.02} = 1.12745$. GREATEST

(B) Store X : $\frac{1.04}{1.14} = 0.91228$

(C) Store Y : $\frac{1.12}{1.05} = 1.06667$

(D) Store Z: $\frac{0.80}{0.93} = 0.86022$

39.**Store W ,Store X ,and Store Y .**B ecause Profit = R evenue - C ost,start by thinking about w hether the changes to R evenue and C osts w ere positive or negative for each of the stores.

(A) C O R R EC T.Store W : R evenue decreased by $400,000,and costs increased by 15% .B oth changes negatively affect profit.

(B) C O R R EC T.Store X : R evenue increased by $520,000,but costs also increased by 4% .Profit in 2012 could be greater than,less than,or equal to profit in 2011,depending on the store's cost structure.Try sam ple num bers to show that profit could have decreased.If in 2011,revenue w as $20,000,000 and costs w ere $15,000,000,the profit w as

$5,000,000.In 2012,revenue w ould be $20,520,000 and costs $15,600,000,m aking profit $4,920,000,less than in the previous year.

(C) C O R R EC T.Store Y : R evenue decreased by $365,000,and costs increased by 12% .B oth changes negatively affect profit.

(D) Store Z: R evenue increased by $125,000,and costs decreased by 20% .B oth changes positively affect profit.

40.**(B)**.C onsider each statem ent individually:

(A) N ot necessarily true.W hile Store X had the greatest increase in revenue,in dollars,it is im possible to calculate percent change in revenue $\left(\frac{\text{Difference}}{\text{Original}} \times 100\right)\%$ for any of the stores w ithout inform ation about the actual dollar am ount of their revenue in either year.

(B) TR U E .Per custom er revenue is $\frac{\text{Revenue}}{\text{Number of customers}}$.Store Z experienced an increase in revenue and a decrease in num ber of distinct custom ers,both of w hich increase per custom er revenue.

(C) N ot necessarily true.W hile Store W had the greatest *percent* increase in total costs,it is im possible to say w hether this w as the greatest increase *in dollars* w ithout know ing the actual dollar am ount of total costs for each of the stores that experienced a cost increase.

(D) N ot necessarily true.The chart says nothing about repeat custom ers,only “distinct” custom ers.

(E) N ot necessarily true.The chart says nothing about absolute num bers of distinct custom ers at any of the stores, only percent change from 2011 to 2012.

Problem Set K : M uch of the detail in this chart is given in the title and other text.A ccording to the title and the * note below ,the chart show s range of calories burned per hour by people in the 130 to 205 pound w eight range w hen doing various activities.

41.**I and II only.**C onsider each statem ent individually:

I.C ould B e True.A 130 pound person typing for 10 hours w ould burn less than 1,000 calories,w hich is less than the num ber of calories burned by a 205 pound person doing one of several activities on the chart for 1 hour (certainly jai alai and sw im m ing the butterfly stroke burn m ore than 1,000 calories).

II.C ould B e True.In general,the range of calories burned per hour is greater for jai alai than for sw im m ing the butterfly stroke.The people in question are about the sam e w eight,but don’t m ake any assum ptions about how num ber of calories burned m ight be a function of w eight in this range (i.e.,is the relationship linear?).A ll that m atters is that the calorie burning ranges for the tw o activities overlap,and both people fall in the w eight range,so it *could* be true that a 175 pound person playing jai alai for one hour burns few er calories than a 180 pound person sw im m ing the butterfly stroke for one hour.

III.C annot B e True.The *average* calories burned by tw o people playing table tennis for 1 hour is a m axim um of about 375.Tw o people typing for 3 hours burn as m any calories *total* as one person typing for 2 × 3 = 6 hours,w hich is a m inim um of about 550.“A t m ost 375” cannot be greater than “at least 550.”

42.**(E).**For each com bination of activities,look at the m inim um value on the chart for the 130 pound person and the m axim um value on the chart for the 205 pound person.

(A) B adm inton (m inim um) + Table tennis (m axim um) = 275 + 375 = 650
(B) W restling (m inim um) + Track and field,hurdles (m axim um) = 350 + 925 = 1,275
(C) Typing (m inim um) + Sw im m ing,butterfly stroke (m axim um) = under 100 + 1025 = under 1,125 (D) Sailing,com petition (m inim um) + A erobics (m axim um) = 300 + 600 = 900
(E) C O R R EC T.Typing (m inim um) + C roquet (m axim um) = under 100 + over 225 = about 325

A lternatively,note that typing and croquet are the tw o activities that burn the few est calories per hour overall.A 130 pound person and a 205 pound person doing 1 hour of activity from the chart each w ould only burn few er calories total if both people w ere typing.

Problem Set L: The table categorizes 50 A frican countries according to G D P (row s) and population (colum ns). N otice that each row sum s to a subtotal num ber of countries w ith that G D P range,and each colum n sum s to a subtotal num ber of countries w ith that population range.B oth the subtotal row and subtotal colum n sum to 50,the grand total. M oreover,notice that both population and G D P are show n in descending order: high population/high G D P countries are in the upper left corner of the table,w hile low population/low G D P countries are in the low er right corner of the table.

43.**(A).**G D P betw een $10 billion and $20 billion is a single row in the table.Population betw een 10 and 50 m illion people includes tw o colum ns in the table.Look at the intersections betw een this row and tw o colum ns.There are 3 countries at the intersection of 10 to 20 m illion population and $10 billion to $20 billion G D P,and there are 3 countries at the intersection of 20 to 50 m illion population and $10 billion to $20 billion G D P,for a total of 6 countries.

44.**(C).**A dding the entries that are in the intersection of the bottom tw o row s (less than $20 billion G D P) and in the last three colum ns (population less than 20 m illion),the num ber of countries is 3 + 3 + 3 + 7 + 8 + 7 = 31.O ut of 50 countries,31 fit this description,so the percent is $\left(\frac{31}{50}\times 100\right)\%$ or 62% .

45.**(B).**There are 13 countries w ith G D Ps betw een $10 billion and $20 billion,and of these,3 have populations betw een 10 m illion and 20 m illion.Thus the percent is $\left(\frac{3}{13}\times 100\right)\%$ or approxim ately 23% .

46.**(D).**For each choice,carefully find the row (s)/colum n(s) that fit the description in,and sum all table entries that apply.

(A) M ore than $10 billion G D P (top 3 row s) intersecting w ith population less than 20 m illion (3 colum ns on right, before the subtotal colum n): 0 + 0 + 0 + 1 + 1 + 0 + 3 + 3 + 3 = 11
(B) Less than $20 billion G D P (bottom 2 row s,above the subtotal row) intersecting w ith population m ore than 10

m illion (3 colum ns on left): 1 + 3 + 3 + 0 + 0 + 7 = 14
(C) M ore than $20 billion G D P (entire top 2 row s,so sum the subtotal colum n in those row s): 5 + 10 = 15
(D) Less than $100 billion G D P (bottom 3 row s,above the subtotal row) intersecting w ith population less than 10 m illion (2 colum ns on right,before the subtotal colum n): 1 + 0 + 3 + 3 + 8 + 7 = 22
(E) Less than $100 billion G D P (bottom 3 row s,above the subtotal row) intersecting w ith population betw een 10 m illion and 50 m illion (2nd and 3rd colum n): 7 + 1 + 3 + 3 + 0 + 7 = 21

C hoice (D),22,is the greatest.

Problem Set M : This pie chart represents about 76 m illion ow ner-occupied housing units,categorized by how m any people live in the household.D on't let the sm aller pie chart on the right throw you off.It is just a w ay to "zoom in" on the relatively sm all categories of households w ith at least 5 people.These categories could have been show n as sm all slivers in the pie chart on the left (notice that 6.7% + 2.6% + 1.8% = 11.1% ,the "O ther" category in the chart on the left).

47.**(D).**Sum the households w ith one,tw o,or three people (i.e.,"few er than four people").Together these account for 21.6% + 36.3% + 16.5% = 74.4% of the total.

48.**(E).**A ccording to the chart,6.7% of the 75,986,074 households are 5-person households.In the calculator, m ultiply 0.067 by 76 (keep "m illion" in m ind).The result is about 5,so the answ er is 5 m illion households.

49.**(B).**A pproxim ate the total num ber of households as 76 m illion (close enough to 75,986,074).There are 21.6% of the total,or approxim ately 16.4 m illion,1-person households.Since each such household has only 1 person,this represents about 16.4 m illion people.

There are 16.5% of the total,or approxim ately 12.5 m illion,3-person households.Since each of these households has 3 people,that is about 37.5 m illion people.

There are 6.7% of the total,or approxim ately 5.1 m illion,5-person households.Since each of these households has 5 people,that is about 25.5 m illion people.

Since 16.4 m illion < 25.5 m illion < 37.5 m illion,the correct ranking is 1-person households,5-person households, 3-person households.

50.**(A).**The 2- to 3- person range contains 36.3% + 16.5% = 52.8% of households,so this is the correct answ er. Q uickly rule out the other choices as a check.
(B) The 3- to 4- person range contains 16.5% + 14.5% = 31.0% of households.
(C) The 4- to 5- person range contains 14.5% + 6.7% = 21.2% of households.
(D) The 5- to 6-person range contains 6.7% + 2.6% = 9.3% of households.
(E) The 6- to 7-person range contains at m ost 2.6% + 1.8% = at m ost 4.4% of households (rem em ber that som e of the 1.8% could consist of households w ith m ore than 7 people).

A ll of the choices other than (A) are less than 50% .